

TRANSMITTAL OF APPEAL BRIEF (Small Entity)

Docket No.
1945/193

In Re Application Of: Swift et al.

Serial No.
09/305,417Filing Date
May 5, 1999Examiner
Church, C.Group Art Unit
2876

Invention: MOBILE X-RAY INSPECTION SYSTEM FOR LARGE OBJECTS



TO THE ASSISTANT COMMISSIONER FOR PATENTS:

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Dated: December 8, 2000

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Swift et al.

Serial No.: 09/305,417

Date Filed: May 5, 1999



Attorney Docket: 1945/193

Examiner: Church, C.

Art Unit: 2876

Invention: MOBILE X-RAY INSPECTION SYSTEM FOR LARGE OBJECTS

CERTIFICATE OF MAILING

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By:


Samuel J. Petuchowski, Esq.

Commissioner for Patents
Washington, D.C. 20231

APPEAL BRIEF

TABLE OF CONTENTS

REAL PARTY IN INTEREST	3
STATEMENT OF RELATED APPEALS AND INTERFERENCES	3
STATUS OF CLAIMS	3
STATUS OF AMENDMENTS	3
SUMMARY OF THE INVENTION	3
ISSUES	4
GROUPING OF CLAIMS	5
ARGUMENT	6

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A.	All device claims as well as the method claim require a vehicle that emits a beam of penetrating radiation for scanning an object both while the vehicle is moving forward and while the vehicle is moving backwards..	6
B.	Husseiny neither teaches nor suggests scanning an object both while the vehicle is moving forward and while the vehicle is moving backwards.....	7
C.	Since the requirement, in independent claim 1, of reversible movability during actual scanning of a cargo container and generation of a scatter signal incident thereto, is nowhere described, taught or suggested by Husseiny, it follows that the independent claim and the claims dependent therefrom are patentable over Husseiny.	10
D.	Since the requirement, in independent claim 7, of processing a scatter signal as a reversibly moveable bed is moved forward and backward to form an image of the contents of a cargo container, is nowhere described, taught or suggested by Husseiny, it follows that claim 7 is patentable over Husseiny.	11
CONCLUSION		11
CLAIMS ON APPEAL		APPENDIX

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I. Real Party in Interest

The owner of the present application is American Science and Engineering, Inc.

II. Related Appeals and Interferences

Appellant's legal representative is not aware of any other appeals or interferences which will directly affect, or be directly affected by, or have a bearing on, the Board's decision in the present appeal.

III. Status of Claims

Claims 1-7 stand rejected. All claims now stand rejected as being unpatentable under 35 U.S.C. § 103(a).

IV. Status of Amendments

The Amendment to claim 7 filed with Applicant's Response dated August 11, 2000 was entered prior to issuance of the Advisory Action of August 29, 2000.

V. Summary of the Invention

The present invention provides a novel device and method for imaging the contents of large cargo containers, using a vehicle that provides both over-road mobility as well as the capability to scan long objects such as trucks or train cars.

There is a problem in scanning a tall vehicle with a beam of x-rays when the source of x-rays is mounted on a mobile inspection platform that inspects during motion of the platform. The problem is that the entire height of the inspected vehicle may not be encompassed by the vertical range in sweep of the illuminating beam. The invention solves this problem by scanning the vehicle twice: once as it passes it in a forward direction, and then again, as it passes it in a reverse direction.

The inventive features of the invention are further set forth in each of the claims, as discussed in detail *infra* at Section VII, "Grouping of Claims."

VI. Issues

1. Are claims 1-7 patentable over U.S. Patent no. 5,692,029 ("Husseiny"), under 35 U.S.C. § 103(a)?

2. More particularly, does Husseiny describe, teach, or suggest, in inspecting a cargo container using x-rays, that a bed having a motorized drive, a source of penetrating radiation, and a scatter detector, be moved forward and backward along a direction thereby causing a beam of penetrating radiation to traverse the cargo container and cause the scatter detector to provide a signal for characterizing the cargo container?

3. Does Husseiny additionally describe, teach, or suggest, a method for producing an x-ray scatter image of a cargo container by moving a bed-mounted source of penetrating radiation forward and backward along a horizontal direction.

VII. Grouping of Claims

All claims are directed either to a device improvement or to a method for producing an x-ray scatter image of a large object.

Claim 1 is an independent apparatus claim drawn to an improved device for inspecting a cargo container with penetrating radiation. The first element of claim 1 is a bed that is *reversibly moveable* along a direction having a horizontal component. The second element is a source of penetrating radiation, where the penetrating radiation is typically x-ray radiation and the source is typically an x-ray tube, though Claim 1 is not so limited. The third element is a motorized drive that moves the bed in the direction having a horizontal component, and the fourth element is a scatter detector mounted on the bed that detects radiation scattered by the inspected object. During motion of the bed forward and backwards alongside a cargo container, the beam traverses the cargo container. Meanwhile, radiation scattered by the inspected object is detected by the scatter detector which provides a signal for characterizing the cargo container and any contents it may contain.

The issue before the Board is whether element (a) of claim 1, the bed capable of reversible motion during scanning, in conjunction with the limitation that the beam traverse the cargo container and that each scatter detector provide a characterizing signal during both forward and backward motion, distinguish claim 1 over the cited prior art. Thus, independent claim 1 and claims 2-6 that depend from claim 1 constitute a group of claims that stand or fall together.

Claim 7 is an independent method claim drawn to a method for producing an x-ray image of a large object. Since the device claims 1-6 do not require the production of an image, the patentability of claim 7 is a separate question. The method of claim 7 has three steps. The first is to provide a device like that claimed in Claim 1. The second is to drive the device past a cargo container, and the third is to process the output signal of a scatter detector as the bed is moved forward and backward to form an image of the contents of the cargo container. Since the formation of an image is not required by independent device claim 1, the patentability of claim 7 raises an issue before the Board separate from the patentability of claims 1-6. The issue before the Board, in this case, is whether element (c) of claim 7 distinguishes claim 7 over the cited prior art.

VIII. Argument

- A. All device claims as well as the method claim require a vehicle that emits a beam of penetrating radiation for scanning an object both while the vehicle is moving forward and while the vehicle is moving backwards.**

The crux of the issue underlying the rejection of all of the pending device claims over the Husseiny reference is encompassed in the requirement, in independent device claim 1, of a reversibly moveable bed such that the beam is caused to traverse a cargo container as the bed is moved forward and backward. The sole independent method claim, claim 7, requires the step of processing a signal from the output of a scatter detector as a bed bearing a source of penetrating radiation is moved forward and

backward, in order to produce an image of the contents of the interrogated cargo container.

In both cases, it is incumbent upon the claimed device and method that scanning of the inspected object occur during motion, in *both directions*, of the platform (or 'bed') upon which the x-ray source is mounted.

B. Husseiny neither teaches nor suggests scanning an object both while the vehicle is moving forward and while the vehicle is moving backwards.

The sole cited reference, namely Husseiny, does not teach scanning an object with a source of x-rays mounted on a vehicle while the vehicle is moving in both forward and backward directions.

Husseiny describes four clearly delineated x-ray inspection modalities which are referred to in the Husseiny patent as 'aspects' (Husseiny, col. 13, line 35, *et seq.*) of the subject matter claimed by Husseiny. The four x-ray inspection modalities of Husseiny are mutually exclusive, with the exception of the first aspect (col. 17, line 45 through col. 28, line 5) and the second aspect (col. 28, line 6 through col. 37, line 45), which, as taught by Husseiny, may be employed in conjunction with one another. These 'aspects' should not be conflated or confounded, because there is no suggestion in Husseiny to do so. Indeed, Husseiny positively teaches distinction among them.

The first and second inspection modalities of Husseiny relate to baggage inspection and the conveyance of carry-on articles, baggage and cargo past fixed

inspection sites. The third distinct inspection modality of Hussein (col. 37, line 46 through col. 39, line 33) is a portable probe for inspecting concealed compartments aboard vessels. Finally, the fourth distinct inspection modality of Hussein (col. 39, line 34 through col. 46, line 19) is the one that refers to a vehicle. In particular, the fourth aspect of the Hussein invention is a dual-energy backscatter imaging system in which a beam is laterally scanned across a transverse swatch of the ground as a source and a detector are propelled in a forward direction on an all terrain vehicle remotely controlled by an operator. The Hussein vehicle goes in one direction, namely, *ahead* of the operator who is using the vehicle to detect hidden mines.

Hussein nowhere suggests the use of a vehicle (*i.e.*, aspect #4) for any application other than the detection of buried mines or ordnance.

Examiner's reading of the introductory paragraph of the Background section of Hussein (co. 1, lines 10-18) to suggest that Hussein's vehicle (aspect #4) might be used for the inspection of cargo is acknowledged, but respectfully traversed. A careful reading of Hussein reveals that Hussein considers "the invention" to encompass a) embodiments for cargo inspection, and b) other, distinct, embodiments employing vehicles.

Indeed, the only explicit reference to cargo containers in the Hussein patent is at col. 7, lines 38-48, where prior art U.S. Pat. No. 4,599,740 is discussed for the proposition that continuous beams may be transmitted across conveyors along which units to be inspected, including cargo containers, may be conveyed. Thus, Hussein teaches that a

fixed source is used for inspecting moving cargo containers.

And even, arguendo, were the Background section of Hussein to be read in a manner as to apply vehicle-based inspection to cargo containers, the particular problem presented by large inspected objects, namely that they may not permit comprehensive scanning in a single pass, is nowhere suggested by Hussein. The aspect of the inspection problem presented by a tall object that is close to the scanning source is nowhere raised by Hussein.

Moreover, there is no suggestion in Hussein that the results of multiple passes of a scanning vehicle might be used, together, either to characterize the contents of a container or to form an image of its contents. Indeed, using the results of two distinct and oppositely directed scans to form a single image would not have occurred to a person of ordinary skill in the art at the time the application was filed.

Therefore, a rejection over Hussein must rest either on inherency or obviousness. The capacity to acquire and register data obtained by scanning an object in two opposite directions cannot be inherent in Hussein since Hussein contemplates, both in the case of cargo conveyed on a conveyor, and in the case of a vehicle traversing the ground, that scanning be performed only in a single forward direction.¹

Nor was bidirectional acquisition of x-ray data obvious at the time the application was filed since the problem of registering the data obtained in the two

¹The side-to-side oscillatory motion of the beam (e.g., Hussein, col. 41, lines 18-25) is not germane to the present discussion, since the vehicle (or cargo, in the case of a conveyor) is, itself, moved only in a single forward direction.

directions so as either to characterize the contents of a cargo container or to form an integral image is nowhere taught or suggested in any art of record.

C. Since the requirement, in independent claim 1, of reversible movability during actual scanning of a cargo container and generation of a scatter signal incident thereto, is nowhere described, taught or suggested by Hussein, it follows that the independent claim and the claims dependent therefrom are patentable over Hussein.

Hussein clearly lacks any teaching or suggestion of scanning a cargo container, or any other object, in more than the forward direction.

Examiner, in rejecting all claims as obvious over Hussein, states, in the Office Action of April 11, 2000, that "[the] use of a reversible drive to scan containers in two directions or for other purposes such as parking or for avoiding large objects would have been common and obvious"

Applicants traverse the notion that the use of a reversible drive on a vehicle to scan containers is either common or obvious, and demand that an evidentiary showing be provided in support of any such contention.

Applicants further traverse the implication that the use of a reversible drive for parking a vehicle or for avoiding large objects makes its use for x-ray scanning obvious. Indeed, the particular problems presented by registration of forward- and backward-acquired data make the ordinary reversal of a scanning source entirely unsuited to acquiring scatter data in such a manner.

Therefore, claim 1, and claims 2-6 depending therefrom, are patentable over Hussein.

D. Since the requirement, in independent claim 7, of processing a scatter signal as a reversibly moveable bed is moved forward and backward to form an image of the contents of a cargo container, is nowhere described, taught or suggested by Hussein, it follows that claim 7 is patentable over Hussein.

Hussein refers to creation of an image by use of a vehicle in the following terms:

For verification, the output of the detector is transmitted to a video display 909, coupled with *the forward motion* of the operator 902 to produce a two dimensional image of the backscattering from the object. (Hussein, col. 40, lines 24-28, emphasis added.)

There is no suggestion in Hussein that imaging may be achieved by motion in the forward direction followed by motion in the backward direction, nor is the acquisition of an image in this manner obvious in view of Hussein.

Therefore, claim 7 is patentable over Hussein.

IX. Conclusion

For the reasons cited above, Applicants submit that each claim present in the application recites an invention that patentably distinguishes over the art of record and that allowability of each and every one of these claims should be indicated by reversal of the Examiner's rejections.

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Respectfully submitted,

A handwritten signature in black ink, appearing to read 'S. Petuchowski', written in a cursive style.

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APPENDIX
CLAIMS ON APPEAL

1. A device, for inspecting a cargo container with penetrating radiation, the device comprising:

- a. a bed that is reversibly moveable along a direction having a horizontal component;
- b. a source of penetrating radiation, mounted on the bed for providing a beam having a central axis, the central axis being predominantly horizontal;
- c. a motorized drive for moving the bed in the first direction;
- d. at least one scatter detector mounted on the bed, each scatter detector having a signal output;

so that, as the bed is moved forward and backward along the direction, the beam is caused to traverse the cargo container as the bed is moved and each scatter detector provides a signal for characterizing the cargo container and any contents of the cargo container.

2. A device according to claim 1, wherein the a source of penetrating radiation is characterized by a source axis adjustable over a range of angles about the horizontal.

3. A device according to claim 1, further including a remotely operated actuator for setting a desired x-ray beam angle.

4. A device according to claim 1, further including an interlock for disabling the source of penetrating radiation unless the bed is in motion.

5. A device according to claim 1, wherein the scatter detector is a backscatter

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detector.

6. A device according to claim 1, wherein the beam is a pencil beam scanned repeatedly about an axis orthogonal to the source axis.

7. A method for producing an x-ray scatter image of a cargo container, the method comprising:

- a. providing a device having:
 - i. a bed reversibly moveable along a horizontal direction;
 - ii. a source of penetrating radiation, mounted on the bed, for providing a beam characterized by an adjustable beam axis;
 - iii. a motorized drive for moving the bed in the first direction; and
 - iv. at least one scatter detector mounted on the bed and having a signal output;
- b. using the motorized drive to move the device past the cargo container so as to cause any contents of the cargo container to be scanned by the beam; and
- c. processing the signal from the signal output of the scatter detector as the bed is moved forward and backward along the horizontal direction to form an image of the contents of the cargo container.